

The Use of Computer Technology in an Interactive or “Real Time” Performance Environment

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Since my first work with electronics in music, I have felt strongly that music should come from one human to another and that the medium should always be at the service of the artist. The electronic medium has the possibility, where desirable, to bypass the performer who has traditionally acted as the intermediary between the composer and the audience. In order to accomplish these things I needed to develop a software which was always ‘in service’ to the composer/musician. To this end, I with Mark Coniglio, developed the software language, *Interactor*®.

In addition to the software, I have developed a kind of philosophy regarding the use of electronics in music/art making. What follows is an outline of some of these conclusions regarding real time interaction with the computer in performance.

There are at least three kinds of interactive environments: public performances, installations, and home media, however, in this article I will concentrate on the area of performance. Two basic modes for the use of computer in performance. 1-Background (transparent) mode. 2-Forefront mode.

KEY WORDS: The electronic medium, Two basic modes for the use of computer in performance 1-Background (transparent) mode. 2-Forefront mode.

Since my first work with electronics in music, I have felt strongly that music should come from one human to another and that the medium should always be at the service of the artist. The electronic medium has the possibility, where desirable, to bypass the performer who has traditionally acted as the intermediary between the composer and the audience. It is this directness which has always attracted me to this medium and has informed most of my research as well as creative output. It also follows that when a human is in front of us (on the stage), he/she should be our primary focus. Where there is no visual focus (a recording, for example) the focus should

be on the music as communication of a human idea, thought and/or gesture. (It is for this reason I have steered shy of algorithmic composition).

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There are at least three kinds of interactive environments: public performances, installations, and home media, however, in this article I will concentrate on the area of performance.

Two basic modes for the use of computer in performance are:

- 1 Background (transparent) mode. In this mode the electronics are invisible and act as a support for the performer.
- 2 Forefront mode. Here the electronics are placed in a partnership or even 'soloist' position.

Five uses of the computer in live performance are:

- 1 the computer as the only instrument
- 2 the computer as paired with traditional instruments.
- 3 the computer as used to control the real time modification of the traditional instruments.
- 4 the computer as used to control and/or generate other media such as lights and images.
- 5 the computer as used in various combinations of 2-4.

And, finally, there are two types of input control in live performance.

The first I call static control in which the computer is told to activate certain functions by simple start/stop commands and where the result is pre-programmed but the timing, the 'when' and 'what' are done in performance. This is usually done by key closures on the computer keyboard or other switching type controllers.

And, the second is dynamic control in which some form of sensing device is used which reads aspects of performance qualities on the part of one or more performers and/or their instruments.

The Background (Transparent) Mode:

The Background (Transparent) Mode: in which the electronics are invisible and act as a support for the performer.

The basic concept of transparent electronics is to use interactive technology to serve a performer, either on a traditional instrument or a midi instrument. My 'Ghost' pieces fall into this category, as well as *Music for Three Imaginary Ballets*, and my chamber opera, *Jacob's Room*.

There are 13 Ghost pieces. They span almost 10 years starting in 1976. Each work uses a single set of electronics but with an individualized control and all of the modification and control are in real time. The signal processing consists of:

Frequency shifting (up and/or down 0–1000 cycles)

Amplitude modulation

Stereo spacial location

The idea of these works was to place a soloist or soloists in the proscenium and to create a dynamic acoustic environment in which he/she performs. The modification of the instrumental sound during the performance adds dimension to the narrative of the music. It might amplify the pulse of music by multiplying the internal pulses played by the musician and, at the same time, move the sound at a complimentary rhythm from side to side. We might, for instance, hear the musician playing 16th notes which are being pulsed at the tempo of 32nd notes and moving from side to side at the beginning of phrases. At other times stretching of pitches may become exaggerated by pitch shifting. And, in other instances, a kind of acoustical environment occurs as in the example from *Trembling*. The work on these pieces led me to the *Imaginary Ballets: The Key to Songs, And the Butterflies Begin to Sing* and *All My Hummingbirds Have Alibis*.

(*The Key to Songs* is the only one of my works which uses a static control as it was written in 1983–4 as I began working on the software for dynamic control.)

Music for Three Imaginary Ballets

For these works I use the dramatic theatre as a metaphor and coined a term, 'A Theatre of Sound'. In 'A Theatre of Sound', I view the performer as analogous to an actor or actress. Within the dramatic stage environment, the play acts as a springboard for the performer to interpret and carry out the letter and spirit of the script. The use of theatre technology (props, costume, makeup, sound and lighting) help to heighten the performance.

In 'A Theatre of Sound', the musician is the actor, the score is the play and the electronics, both computer sound and instrumental modification are analogous to the technology of the theatre.

In *The Key to songs*, the computer score plays an identical and parallel score to the musician's performance. This creates the illusion that the instruments are undergoing a constant timbral transformation.

In *And the Butterflies Begin to Sing*, the computer follows the keyboard part (it is played either on a midi keyboard with a piano sound module or on a disklavier) and adds more piano notes (which creates a kind of fantastic virtuoso effect to the pianists performance), a coloristic computer orchestra (somewhat like background music in a movie or play) and, by means of midi mixer, alters the sound of the 5 strings in real time.

The final of the three, *All My Hummingbirds Have Alibis*, has two solo instruments, flute and cello, and two Midi instruments (midi mallets and midi keyboard). This is the most technologically sophisticated of the three as the computer is tracking two players simultaneously and providing the computer music background, extensions to the music, the text (through a sampler) and modifying the cello and flute.

All three of these works are dramatic. They have a surreal subtext. And each treat the performers as virtuoso performers as well as characters in this theatre of sound, not too unlike the string players in Charles Ives famous string quartet. The modifications of the instrumental sound is like lighting and costume to the players and the computer generated score is like an environment in which the characters are cast like lights, sound and scenery in a play.

In my Chamber Opera, *Jacob's Room*, these principles are carried out to make an *actual* music drama where images (interactive Laser disc) and lights as well as all of the above are under real time computer control. The imagery and its real-time choreographic animation represent a kind of dream or memory language. Over and over again, certain images return in various forms and collide with verbal and musical images to complement the narrative of hidden memories.

The Forefront Mode

The Forefront Mode: in which the electronics are placed in a partnership or even 'soloist' position.

At present I am working on a series of pieces where the computer and or computer instrument(s) are treated as the performer. And the human performer guides and 'conducts' the performance. Here the orchestra is the metaphor, where the orchestral players perform the detail of the work while the conductor guides and interprets the music in 'real' time. All of my recordings of purely electronic works, starting in 1967 with *Silver Apples of the Moon*, utilized aspects of realtime control. But now it is possible to have finer control and to affect a much larger palette of sound and time.

New controllers such as Coniglio's 'Midi Dancer' and Buchla's Lightning are at the forefront of what will be a large area for development. I am doing two distinctly different kinds of pieces with this idea, one is the control of time and pitch in more conventional approaches to music using a computer with sound modules and a Yamaha Disclavier. The other is a work which is the real time control and shape of time, timbre and gesture. Michel Waisvisz is doing wonderful pioneering work in this area.

The 'conducting' metaphor not only offers a rich area for exploration for live performance, but will eventually afford the 'listener' to interact, guide and 'conduct' with their home media recordings. Thus creating, finally, a truly new chamber music.

Sound examples

28. *Trembling* (ghost piece)
 from: CD Centaur Records CRC 2170
 violin and piano
 duration: 1'00 Opening where the piano and violin are shimmering or "trembling"

2 excerpts from *The Key to Songs*
 from: CD New Albion Records NA012

29. *Power*
 duration: 1'53
30. *Falling*
 during 1'11
 In these two examples the live instruments seem to be changing
31. *All My Hummingbirds Have Alibis*
 from: CD-ROM The Voyager Company AC034000
 duration: 2'52

In this example the mallet and keyboard are playing my voice of recorded scat syllables, When the mallets are pedaled, the computer plays fast runs formed from the note initiated by the mallet player...and follows the tempo and loudness. When the keyboard and/or the mallet player pedals, the flute and cello are modified.

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